



Advisory: Carbon Monoxide Poisoning Hazards Caused by Boating Operations

Background

Because of the significant number of fatalities and nonfatal carbon monoxide (CO) poisonings on NPS waterways, an exposure assessment was conducted by the Department of Interior, National Park Service (NPS), and the National Institute for Occupational Safety and Health (NIOSH), to determine potential exposure to CO during various boating operations. The results of the assessment indicated that dangerous, life threatening levels of CO can exist around the stern and on, around, and under the swim platforms of boats.

Generator and boat engine operation while at anchor, during boat idling, and operating at slow speeds with a tailwind may result in exhaust accumulating at the stern in what is known as the "station wagon effect." Dragging or teak surfing from a ski platform is also dangerous. Concentrations of CO 25 times greater than government and environmental thresholds were measured in these locations in such situations.

What is CO and why is it a problem?

Boat engines and generators produce CO, a colorless, odorless, tasteless, and lethal gas that can build up around those nearby without their awareness. Symptoms of carbon monoxide exposure include nausea, dizziness, headache, and drowsiness, and can be confused with heat exhaustion, dehydration, or excess alcohol consumption. CO poisoning may result in a serious medical condition or death.

Considerations

The following considerations should be taken into account when operating and working around boats:

- The greatest focus has been on CO poisoning associated with houseboats. However, many vessels, including power boats, have the potential for this danger.
- Although most houseboats are equipped with CO detectors within the cabin areas, detectors will not provide warning of CO hazards in areas outside of the cabin.
- The presence of a breeze or choppy water does not necessarily mitigate the CO hazard.

- You do not have to be in the water behind the stern to encounter higher CO levels. In some circumstances, the station wagon effect can result in increased CO levels in the boat cockpit and even in the boat cabin if the cockpit door is open.

What should be done?

We strongly encourage you to take all necessary precautions to avoid the hazards of CO poisoning for employees, visitors, and customers. The following rules will make park boating experiences safer.

1. Ensure applicable park staff and concession marina employees are provided awareness training on the hazards of CO.
2. Include warning literature and training in the boater safety documentation and orientation provided to boat rental customers.
3. Prohibit running engines (including generators) during refueling operations.
4. Install and routinely check and document CO monitoring systems/detectors on boats to ensure they are working properly.
5. Post warning signs at docks and on or near sources of exhaust. The signage should be legible and clearly written. For example, a warning sign could read:

Carbon monoxide is produced by all engine and generator sets.

Exposure to carbon monoxide can cause brain damage or death.

Signs of exposure include nausea, dizziness, and drowsiness.

To avoid carbon monoxide exposure while engines or generators are running:

- *Consider wind direction*
 - *Do not use the swim platform or boarding ladder*
 - *Do not swim behind the boat*
 - *Do not swim under the boat*
 - *Keep aft doors and windows closed*
6. Work with boat manufacturers to provide safer designs such as side, rather than stern, generator exhausts.

Be proactive; prevent carbon monoxide poisonings. Additional information about this health hazard can be found at the following sites:

- www.safecoproducts.com
- www.uscgboating.org/alerts/alertsview.aspx?id=8
- <http://safety.net.smis.doi.gov/cohouseboats.htm>
- www.cdc.gov/nceh/airpollution/carbonmonoxide/spotlight.htm